SC/59/SH

Interim Report: IWC Research Contract 16, Antarctic Humpback Whale Catalogue

Contact author: Judith M. Allen

Judith M. Allen[1], Carole Carlson, Ph.D.[1], Bethany Holm[1] and Peter Stevick, Ph.D.[1,2]

[1]College of the Atlantic
105 Eden Street
Bar Harbor, ME 04609 USA
Ph: (207) 288-5015
jallen@coa.edu

[2]Hebridean Whale and Dolphin Trust
28 Main Street
Tobermory, Isle of Mull, Scotland

Abstract

College of the Atlantic (COA) has maintained a collection of humpback whale (*Megaptera novaeangliae*) identification photographs from the Antarctic since 1987. In 1998 the International Whaling Commission (IWC) approved funding to support the expansion of this catalogue to members of the IWC, with an aim to substantially improve the accessibility and organization of the database. The collection has been internationally collaborative from its beginning, with photographic contributions from 202 researchers and opportunistic sources.

During the contract period, the Antarctic Humpback Whale Catalogue (AHWC) catalogued 418 photo-identification images representing 288 individual humpback whales from Antarctic and southern Hemisphere waters. These images were submitted by 38 individuals and research organizations. Photographic comparison of submitted photographs to the AHWC during the contract period yielded 85 previously known individuals. These submissions bring the total number of catalogued whales to 3,023. This report details these findings, as well as other recent advances in the AHWC.

Introduction

College of the Atlantic (COA) houses the Antarctic Humpback Whale Catalogue. In 1998, the International Whaling Commission (IWC) approved funding to support the expansion of this catalogue, with an aim to substantially improve the accessibility and scope of the project. Early matches confirmed migration of humpbacks between the Antarctic Peninsula and the western coast of South America (Ecuador and Colombia). More recent matches have confirmed migration of humpbacks between the eastern coast of South America (Brazil) and Sector II (South Gerogia), between East Australia and Sector V, and between the western coast of Central America (Costa Rica) and the Antarctic Peninsula. The collection is internationally collaborative, with photographic contributions from 202 researchers and opportunistic sources. This interim report summarizes progress to date on the various tasks assigned within the contract between COA and the IWC.

Task 1: Compile three collections of photographs of Antarctic Humpback Whales

A total of 418 photographs of 288 individuals were catalogued during the contract period, including the following:

International Whaling Commission (IWC): 61 individuals, SOWER cruises Areas III-V
Projeto Baleia Jubarte (PBJ): 121 individuals, Brazil
Instituto Antártico Chileno (INACH): 27 individuals, Chile
Centro de Conservacion Cetacea (CCC): 8 individuals, Chile
Fundación Ecuatoriana para el Estudio de Mamíferos Marinos (FEMM): 19 individuals, Ecuador
Institute of Cetacean Research (ICR): 1 individual, Area V
Opportunistic: 43 individuals, Antarctic Peninsula; 4 individuals, Gabon; 1 individual, Ghana; 1 individual, S. Africa; 2 individuals, W. Australia

Table 1. Photographs catalogued during contract period.

	No. of photographs	No. of whales	No. of resightings	No. of new whales
Antarctic Peninsula	75	43	9	34
Antarctica	105	62	0	62
Gabon	5	4	0	4
Ghana	1	1	0	1
S. Africa	2	1	0	1
Brazil	164	121	59	62
Chile	35	35	0	35
Ecuador	28	18	16	2
E. Australia	1	1	1	0
W. Australia	2	2	0	2
Total	418	288	85	203

Matches made during the contract period to previously sighted individuals include resightings between Ecuador and the Antarctic Peninsula (3), and within-region resightings in the Antarctic Peninsula (9), Brazil (59), Ecuador (15) and E. Australia (1).

The fluke photographic collection now consists of 4,635 photographs of 2,692 individual whales. Of these 212 were sighted in more than one year. The right dorsal fin/flank collection consists of 516 photographs of 408 individuals. The left dorsal fin/flank collection consists of 500 photographs of 404 individuals. The longest interval between re-sightings was 18 years for individual #0057, first identified in1986 and photographed again in 2003. There were 42 individuals with three or more sightings in different areas or years. Distribution of the photographs by region is shown in Table 2.

Table 2. Fluke and dorsal photographic collections, by region. Antarctic Peninsula includes individuals identified along the coast of the AP and South Shetland Islands as far east as Elephant Island (~55°W). Area II includes individuals identified east of Elephant Island to 0° (see SC/57/SH2).

Region	Total # whales	Fluke		R. dorsal		L. dorsal	
		Photos	Whales	Photos	Whales	Photos	Whales
Antarctic Peninsula	891	1665	864	48	32	41	33
Antarctic II-VI total	380	298	175	145	110	169	125
Sector II*	9	14	9				
Sector III	85	107	62	16	13	26	15
Sector IV	156	86	49	82	59	72	63
Sector V	89	63	38	30	26	53	37
Sector VI	30	10	6	17	12	18	12
Gabon	78	94	78	-	-	-	-
Ghana	1	1	1	-	-	-	-
S. Africa	1	2	1	-	-	-	-
St. Helena	2	3	2	-	-	-	-
Brazil	830	1447	828	2	2	5	5
Peru	2	2	2				
Chile	76	81	76	-	-	-	-
Ecuador/Colombia/ Costa Rica	479	638	448	69	27	62	24
American Samoa	44	75	44	-	-	-	-
Tahiti	1	1	1	-	-	-	-
New Zealand	1	2	1	-	-	-	-
E. Australia	7	9	7	1	1	2	1

W. Australia	308	317	242	251	236	221	213
TOTALS	3023	4635	2692	516	408	500	404

Current catalogues from FEMM, PBJ and Projeto Baleias Antartico (PBA) have been submitted to the AHWC, along with photos from the IWC SOWER cruises from 1999/00 through 2005/06. Cataloguing of the PBA catalogue has been completed, and analysis was included in the 2006 report. Analysis of the PBJ catalogue is in progress, with approximately 620 individuals remaining to be catalogued. The FEMM catalogue is in progress, with approximately 400 individuals awaiting analysis. Analysis of photos from the IWC SOWER cruises is almost complete, with 11 awaiting analysis.

Progress continues in efforts to stimulate submission of opportunistic data from eco-tourism cruise ships in the Southern Ocean and from research organizations and expeditions working throughout this region and the Southern Hemisphere. For the period 1981 through 2007, 1178 photos representing 541 individuals have been submitted from ecotourism and other opportunistic sources, as detailed in Table 3 below. Opportunistic data represents a significant portion of the AHWC. In the Antarctic Peninsula, approximately 50% of the catalogued individuals were contributed by opportunistic sources. The availability of this data has broadened our understanding of the exchange between areas and in some cases provided information that was previously not available. The submission of photos from a cruise ship off South Georgia in 2004 of an animal previously seen off Brazil resulted in the first long-distance resighting of an individual from these areas (Stevick, 2006). Photos taken from a cruise ship resulted in one of several matches between the Peninsula and Costa Rica, documenting the longest known migration for any mammal (Rasmussen, 2007). The AHWC provides a unique clearing house for opportunistic data, facilitating public education and participation, and providing a valuable source of data to researchers for scientific analysis.

Task 2. Scan and archive all images and link to databases in Task 3.

All of the catalogued photographs have been digitized. Images are scanned at 300 dpi and stored in TIFF format. Images to be included on the web page are additionally stored at 90dpi in JPG format in a FileMaker Pro database which serves the images to the web page. The image management software iMatch© is used for image analysis. The best images of each individual are stored in the iMatch© database, and assigned categories including pattern type and geographic area. During the past year the iMatch database has been enhanced by the addition of special categories such as injuries and scar shape, allowing the user to further refine searches and increasing the efficiency of analysis. If an individual is not matched to the catalogue in this initial approach, the search is broadened and the individual is compared to the entire catalogue by two technicians before being considered new to the catalogue. Other relevant data can be stored in the database as well, making it a very effective tool for catalogue management. Comparison using iMatch© has reduced the time required for image analysis by as much as 75%.

Table 3. Numbers of individual humpback whales in the AHWC contributed from directed research, ecotourism and other opportunistic sources, by area.

	Directed Humpback Research	Eco-tourism	Other Opportunistic
Antarctic Peninsula	494	387	84
Areas II-VI	337	6	39
Gabon	74	–	4
Ghana	–	–	1
S. Africa	–	–	1
St. Helena	–	–	2
Brazil	821	12	–
Peru	–	–	2
Chile	76	–	–
Ecuador/Colombia/Costa Rica	474	4	6
American Samoa	44	–	–
Tahiti	–	1	–
New Zealand	–	–	1
E. Australia	3	2	4
W. Australia	305	3	–
AHWC Total	2627	413	144

Task 3. Create relational databases for associated field data.

Data is stored in FoxPro relational databases. The fluke and dorsal/flank collections are combined in a single data file but distinguished by use of a data field indicating fluke or dorsal type, to facilitate analysis of the collections independently or collectively. Digital images and data are backed up daily and kept in a separate location.

Task 4. Report to contributors on completion of photo comparison.

A standardized data report is issued to all contributors on completion of cataloguing of submissions. The report includes the catalogue number assigned, the data recorded in the file, and the contributor and region for any previous sighting history.

Task 5. Provide on-line access to the photographic collection.

The AHWC is available on-line at http://www.coa.edu/antarctic. Only those photographs which we have received permission to publish electronically are included in the on-line collection. The database is searchable by fluke pigmentation pattern, geographic area, or catalogue number. Dorsal fin/flank collections are also available on line, although a search criteria allowing the user to specify dorsal fin/flank has not yet been added. Images displayed are identified by catalogue number and the contact organization for the contributor. No additional data is available on-line, and the images displayed are low resolution (90dpi - suitable for display but not for print).

In accordance with guidelines from the 2002 Scientific Committee Meeting and IWC policy, access to images collected on the IWC-funded research cruises is available to everyone. In addition to IWC images, all photographs taken by COA researchers and all opportunistic photos have been included in the public access database. Users may choose to search the public database, or log in as a contributor and search the contributor-only database. All users, whether logging in to the public or contributor-only database, must agree to terms of use, which include not publishing or reproducing information without written consent.

Contributors are contacted to determine whether they wish to keep their photos in the secure database accessible only to fellow contributors, or to include them in the public access database. All contributors are assigned a login and password which gives them access to the secure database and are advised of the security protocol of the project, whereby users are not permitted to share their password with others, or reuse photographs or other information without permission. In the coming year, one of the main project goals will be to update the website.

Publications (* indicates that opportunistically collected data were included in the analysis):

*Allen, J.M., P.T. Stevick and C. Carlson. 2006. The Antarctic Humpback Whale Catalogue: Description and Summary. Document SC/A06/HW58 submitted to the Scientific Committee of the Intl Whal. Comm.

*Rasmussen, K., D.M. Palacios, J. Calambokidis, M.T. Saborio, L. Dalla Rosa, E.R. Secchi, G.H. Steiger, J.M. Allen and G.S. Stone. 2007. Southern Hemisphere humpback whales wintering off Central America: insights from water temperature into the longest mammalian migration. Biol. Lett. doi:10.1098/rsbl.2007.0067.

Rock, J., L.A. Pastene, G. Kaufman, P. Forestell, K. Matsuoka and J. Allen. 2006. A note on East Australia Group V Stock humpback whale movement between feeding and breeding areas based on photo-identification. J. Cet. Res. Man. 8(1):29-31.

*Stevick, P.T., A. Aguayo-Lobo, J.M. Allen, C. Castro, K. Chater, L. Dalla Rosa, F. Félix, B. Haase, M. Llano, C. Olavarría, K. Rasmussen and E. Secchi. 2006. Estimated Abundance of Humpback Whales off the West Coast of Central and South America (Group G). Document SC/A06/HW56 submitted to the Scientific Committee of the Intl Whal. Comm.

*Stevick, P.T., A. Aguayo-Lobo, J.M. Allen, K. Chater, L. Dalla Rosa, C. Olavarría and E. Secchi. 2006. Mark-recapture abundance estimates for humpback whales in the Antarctic Peninsula. Document SC/A06/HW54 submitted to the Scientific Committee of the Intl. Whal. Comm.

*Stevick, P.T., L. Pacheco de Godoy, M. McOsker, M. Engel and J. Allen. 2006. A note on the movement of a humpback whale from Abrolhos Bank, Brazil to South Georgia. J. Cet. Res. Man. 8(3):297-300.

Proposed budget: IWC Research Contract 16, Antarctic Humpback Whale Catalogue

Investigators:
Judith M. Allen [College of the Atlantic, 105 Eden Street, Bar Harbor, ME 04609 USA]
Peter T. Stevick, Ph.D. [Hebridean Whale and Dolphin Trust, Tobermory, Isle of Mull]
Carole Carlson, Ph.D. [Provincetown, MA USA]

Budget 2007-2008: This proposal seeks **£6,600** to continue the cataloging of submitted photographs and further development and enhancement of the system for on-line access. Budgetary amounts are in GBP.

PROJECT BUDGET

Salary:	
Project and database management	2,700
Photo comparison	8,000
Fringe @ 15%	1,600
Phone, fax and postage	100
Supplies	200
Total Budget	£12,600

Requested from IWC: **£6,600**

Budget narrative: We have made tremendous progress in the catalogue with funding support from the IWC. Increasing awareness of the project among research organizations, tour operators and other potential contributors has widened the scope of the collection; research efforts in areas that had not previously been sampled have extended the geographic coverage. The AHWC has grown by 35% in the last two years, from 2238 to 3025 individuals. In spite of adopting more efficient analysis techniques, the recent submission of catalogues from the PBA, PBJ and FEMM and IWC SOWER projects has produced a backlog of over 1,000 photos to be analyzed.

Recognizing the scope of work to be accomplished in the coming year and the importance of timely analysis to the contributing researchers and the scientific community, we are requesting that funding be maintained at **£6,600 GBP**. We will seek funding from other sources to provide the remaining funds required. Additional resources are provided by College of the Atlantic, including equipment and student assistants provided by College of the Atlantic, and time donated by Project Investigators Judith Allen and Carole Carlson.